

WHAT IS CLAIMED:

1. A spinning disk encapsulation apparatus for encapsulating biological material comprising:
  - a center cup including an opening, a reservoir and at least one inner wall defined between the opening and the reservoir with at least one groove defined on at least a portion of the inner wall;
  - an outer collection chamber surrounding at least a portion of the center cup;
  - a motor that rotates at least the center cup; and
  - apparatus that introduces a fluid stream of material comprising the biological material and a polymeric coating solution into the reservoir; whereby as the center cup is rotated the fluid stream of material defines in one or more singulated lines.
2. The encapsulation apparatus of claim 1, wherein the at least one inner wall comprises a first inner wall frustoconical surface tapered outward and having a plurality of grooves defined on the frustoconical surface.
3. The encapsulation apparatus of claim 2, wherein the frustoconical surface forms a cone angle about 50 degrees and there are four evenly spaced grooves.
4. The encapsulation apparatus of claim 2, wherein the plurality of grooves include a first set of grooves defined on the first inner wall and wherein the cup includes a second inner wall defined between the frustoconical surface and the reservoir having a second set of grooves defined in the second inner wall, at least a portion of the first set of grooves aligned

with the second set of grooves.

5. The encapsulation apparatus of claim 2, wherein the plurality of grooves are evenly spaced about the surface.

6. The encapsulation apparatus of claim 2, wherein the motor rotates the center cup at a speed of between 2000 rpm and 8000 rpm.

7. The encapsulation apparatus of claim 1, wherein the apparatus that introduces the fluid stream of material comprises a syringe operated to provide a continuous fluid stream of material at a fixed flow rate.

8. The encapsulation apparatus of claim 7, wherein the fixed flow rate is between 0.5ml/minute and 5ml/minute.

9. A batch of double layer capsules containing biological material produced by a process comprising:

atomizing and gelling a first polymeric suspension containing cell clusters of the biological material in a first polymeric solution to form capsules having a first layer coating surrounding at least a portion of the cell clusters;

applying an electrostatic charge to a liquid carrier medium containing the capsules prior to introducing the carrier medium into a second polymeric solution to create a second polymeric suspension; and

atomizing and gelling the second polymeric suspension containing the separated capsules to form a second layer coating around the capsules,

such that the batch of capsules contains at least 100,000 cell clusters and is processed in a time period of less than about three hours.

10. A spinning disk encapsulation apparatus for encapsulating biological material comprising:

a center cup;

an outer collection chamber surrounding at least a portion of the center cup;

means for rotating at least the center cup;

means for introducing a fluid stream of material comprising the biological material and a polymeric coating solution into the center cup; and

means for forming the fluid stream of material into one or more singulated lines as the center cup is rotated.